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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/074,642	02/12/2002	Christian L. Belady	10018060-1	7173

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HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER	
DUONG, THO V	
ART UNIT	PAPER NUMBER
3743	

DATE MAILED: 11/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/074,642	BELADY ET AL.	
	Examin r	Art Unit	
	Tho v Duong	3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 September 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6,9,10 and 19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6,9,10 and 19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *02 September 2003* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 9/2/2003 have been fully considered but they are not persuasive. Applicant's argument that reference to Chu does not disclose that the pins and the passageways are rectangular therefore it cannot be used to anticipate a claim, has been very carefully considered but is not deemed to be persuasive. First of all, in the Office Action mailed 6/3/2003, claim 6 has not been rejected under anticipation (102) but under 35 U.S.C. 103 (a) as obvious over Chu. Chu substantially discloses all of applicant's claimed invention, which includes the pin and the passageways having cylindrical shape. As per request by the applicant, the examiner advises the applicant to see another reference of Chu et al. (5,394,299 in column 6, lines 14-21) as an evidence available in the prior art to conclude that changing the shape of pins and the passageways from cylindrical to rectangular is just an obvious matter of design of choice and they do not patentably distinguish from each other. As disclosed in Chu (5,394,299), the cylindrical pins and passageway (18,14) has been illustrated over the rectangular pin and passageways is for convenience and the preferred embodiment of the best mode. Furthermore, the examiner disagrees with the applicant that the shape of the pin and the passageways change the thermal transfer function of the thermal interface. The pin and the passageways form a thermal conductive path to transfer heat from the heat source to the heat spreader. By means of thermal conduction, the thermal transfer function of the thermal conductive path depends only the material and the heat transfer surface area of the path but not the shape of the path. As regarding claims 9 and 19, applicant's argument that reference to Chu does not disclose a thermally conductive sponge-like material and rubber sponge material is not a thermal

conductive, has been very carefully considered but is not deemed to be persuasive. The examiner disagrees with applicant's argument because rubber sponge like material is inherently a thermal conductive material since it has a moderate thermal conductivity. For example Furon Silicon Rubber Sponge has 0.5wat/(deg-K-meter) at 5 psi. (See Lamb et al. 5,920,457). As regarding claim 10, applicant's argument that reference to Chu does not disclose the pins and/or spreader form a heat sink, has been very carefully considered but is not deem to be persuasive. As stated in the Office Action mailed 6/3/2003, on page 3, the examiner has pointed out in reference to Chu (column 5, lines 24-27) that if the heat spreader (18) is not sufficient for removing the heat, another heat sink such as fin or a small cold plate can be attached to the spreader (18). Therefore, it is clearly disclosed in the reference to Chu that heat spreader (18) functions as a heat sink.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 9,10 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Chu (US 4,226,281). Chu discloses (figures 1-6) a thermal interface (10) comprising a thermal spreader (18) forming a plurality of passageways (22); a spring element such as layer with a substantially planar face of sponge like material (36) coupled with the spreader (18); and a plurality of thermally conductive cylindrical pins (24) for the passageways and perpendicular with the planar face of the spring element (35); each of the pins (24) having a head (25) and a shaft moving with

the spring element (36); at least part of the shaft being internal to the passageway and forming a gap between the pin (24) and the gap (22), wherein the pin heads (22) collectively and macroscopically conform to an object (12,14) couple thereto; the head (25) protruding from the face of the spring element (36) in a direction away from the spreader (18); the object comprising a plurality of semiconductor packages and dies (12). Chu further discloses (column 5, lines 24-27) that if the heat spreader (18) is not sufficient for removing the heat, another heat sink such as fins or a small cold plate can be attached to the spreader (18). Regarding claim 19, Chu has disclosed all of the structural limitations of the invention. Therefore, it is believed that Chu's thermal interface capable of performing the method for transferring thermal energy from a body to a heat sink as claimed, which includes all of the anticipated apparatus limitations. As regarding claims 9 and 19, rubber sponge like material (36) is inherently a thermal conductive material since it has a moderate thermal conductivity. For example Furon Silicon Rubber Sponge has 0.5wat/(deg-K-meter) at 5 psi. (See Lamb et al. 5,920,457).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 6 is rejected under 35 U.S.C. 103(a) as obvious over Chu (US 4,226,281). Chu discloses (figures 1-6) a thermal interface (10) comprising a thermal spreader (18) forming a plurality of passageways (22); a spring element (32,34,36) coupled with the spreader (18); and a plurality of thermally conductive cylindrical pins (24) for the passageways and perpendicular

with the planar face of the spring element (32,34,36); each of the pins (24) having a head (25) and a shaft moving with the spring element (36); at least part of the shaft being internal to the passageway and forming a gap between the pin (24) and the gap (22), wherein the pin heads (22) collectively and macroscopically conform to an object (12,14) couple thereto to transfer heat from the object to the spreader (18) through the passageway gap formed between the spreader and each of the plurality pins (24). Chu substantially discloses all of applicant's claimed invention except for the limitation that the pin shaft and the passageways being substantially rectangular. At the time the invention was made, it would have been an obvious matter of design choice to a person of ordinary skill in the art to change the shape of the pins and the passageways from cylindrical to rectangular because applicant has not disclose that the rectangular shape provide an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected applicant's invention to perform equally well with any shape of the pins and the passageways because the ability to transfer heat from the object (12) to the heat spreader (18) is not effected by the shape of the pins and the passageways. (See the above Response to Argument).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lamb et al. (US 5,920,457) discloses that rubber sponge like material is inherently to have a moderate thermal conductivity.

Hauschulz et al. (US 5,714,738) discloses that a rubber sponge like material has a thermal conductivity in range 0.06 -0.12 Watts/meter-K.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tho Duong whose telephone number is (703) 305-0768. The examiner can normally be reached on from 9:30-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennet, can be reached on (703) 308-0101. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0861.

Tho Duong

October 28, 2003

Henry Bennett
Supervisory Patent Examiner
Group 3700